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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/568,832

02/17/2006

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HH 307-KFM

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EXAMINER

JOHNSTON, PHILLIP A

ART UNIT

PAPER NUMBER

2881

MAIL DATE

DELIVERY MODE

06/23/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/568,832	<b>Applicant(s)</b> KOLLMER ET AL.	
	<b>Examiner</b> PHILLIP A. JOHNSTON	<b>Art Unit</b> 2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 March 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 February 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

***Detailed Action***

1. This Office Action is submitted in response to the amendment filed 3-7-2008, wherein claims 1-14 are pending.

***Response to Arguments***

2. Applicant's arguments filed 3-7-2008 have been fully considered but they are not persuasive.

3. Applicant argues at page 10 of the remarks that, the cited references have no relation to each other, and even if the teachings of these references are combined, they do not disclose or suggest the particularly advantageous effect of a primary beam with only one kind of ion. Thus, the present independent claims 1 and 6 distinguish patentably over all of these references.

4. The examiner disagrees. The combination of Niehuis, Orloff and Van De Walle disclose the claimed structure including the liquid metal Bismuth ion source of Orloff, where Van De Walle's mixture of multiply and singly charged Bismuth ions generated by the ion source are filtered through the Niehuis mass filter MS and focused onto sample P creating secondary ions that are analyzed by time-of flight mass spectrometer FZA.

Broadly speaking, the use of mass filter MS in Niehuis would be recognized by one of ordinary skill in the art to include separating multiply and singly charged Bismuth ions such that only one charge state would be onwardly transmitted and focused on the sample P. See for example, USPN 6,791,078 to Giles.

In addition, Niehuis provides support for this conclusion at Col. 6, line 42-47, where it is disclosed that the source of primary ions provides an essentially identical

primary ions, which one of ordinary skill would interpret to mean that the primary ions include only one charge state.

The examiner thus concludes from the above that the combination of Niehuis, Orloff and Van De Walle disclose the claimed invention.

5. The rejection of claims 1-7, under 35 USC 103(a) by Neihuis in view of Orloff, and in further view of Van de Walle are maintained.

6. All claims stand finally rejected.

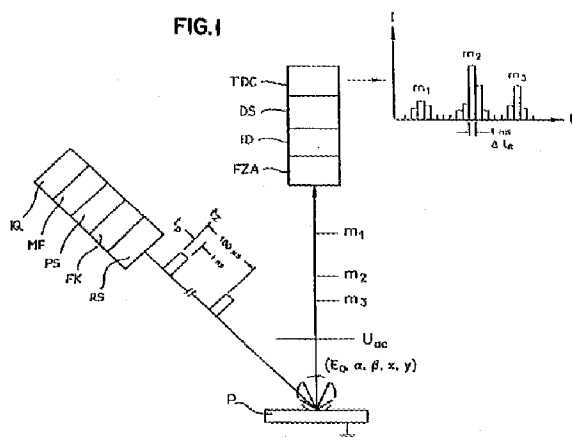
### ***Claims Rejection – 35 U.S.C. 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5,633,4957 to Neihuis, in view of Orloff, USPN 4,426,582, and in further view of Van De Walle et al, "Study of  $\text{Bi}_n^{\text{P}+}$  ions formed in liquid-metal ion sources", Phys. Rev. 1987.

4. Regarding claims 1 and 6, Niehuis teaches a secondary ion-time of flight mass spectrometer shown in Figure 1 below that includes;



- (a) Ion source IQ to create a primary ion beam. Col. 4, line 11-14,
- (b) Time-of-flight analyzer FZA for mass analysis of the secondary particles, where identification is through an appropriate time-resolving ion detector ID. Col. 4, line 18-25,
- (c) Mass Filter MF a filtering device to form of a mass-pure ion beam that is focused on sample P. Col. 4, line 18-23,

5. Niehuis fails to teach the following limitations;

(a) the use of an ion source possessing a heatable ion emitter that is coated in the area exposed to the field with a liquid-metal layer that contains an ionizable metal that is emitted and ionized as the primary ion beam, characterized in that the liquid metal layer is essentially comprised of pure metallic Bismuth or of a low-melting-point alloy containing, in essence, Bismuth, wherein a Bismuth ion mixed beam can be emitted by the ion emitter under the influence of an electric field,

(b) a primary ion beam that contains metal ions with various stages of ionization and cluster statuses, including a number of Bismuth ion types, whose mass is a multiple of monatomic singly or multiply charged Bismuth ions  $\text{Bi}_1^{p+}$ .

(c) a filtering device by which one of a number of Bismuth ion types, whose mass is a multiple of monatomic singly or multiply charged Bismuth ions  $\text{Bi}_1^{p+}$ , is to be filtered out from the Bismuth ion mixed beam in the form of a mass-pure ion beam that is solely comprised of ions of a type  $\text{Bi}_n^{p+}$ , in which  $n \geq 2$  and  $p \geq 1$ , and  $n$  and  $p$  are each a natural number.

Regarding the limitation (a) missing from Niehuis, Orloff teaches a liquid metal ion source having Emitter 11B, which is coated with liquid metal, such as Bismuth, which is ionized at the tip of emitter and produces a bright reliable beam with angular intensity current values of  $10^{-4}$  to  $10^{-5}$  amperes per steradian. See Col. 4, line 1-14; Col. 10, line 1-18; and col. 6, line 12-31.

Orloff modifies Niehuis to provide a simple drawn tungsten field emitter coated with Bismuth.

Therefore, it would have been obvious to one of ordinary skill that Niehuis would use the coated emitter of Orloff to provide a Bismuth coating that is a well wetted and continuous film that coats both the emitter shaft and shank.

Regarding the limitation (b) missing from Niehuis, Van de Walle teaches the use of a liquid metal ion source and SIMS to obtain a complete energy distribution  $\text{Bi}_n^{p+}$  spectra (Note Figure 1 below). See page 5509.

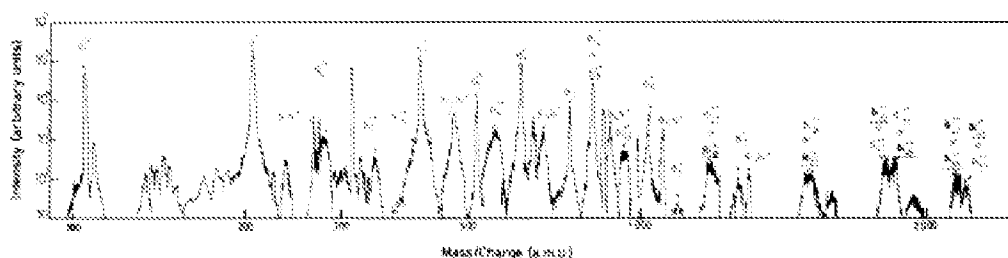


FIG. 1.  $\text{Bi}_n^{p+}$  mass spectrum. In the  $n/p \leq 5$  region, the narrow peaks correspond to  $p=1$  or 2 and the broad peak to  $p=3$ . In the  $n/p \geq 5$  region, as the existence of  $\text{Bi}_n^{p+}$  ions becomes possible (it is forbidden in the preceding region by Coulomb explosion) we give two possible identifications with  $p=3$  or  $p=4$  for the broad peaks, the underlined values seem more likely (see the text). Sometimes the two identifications correspond to two different  $n/p$  values compatible with the peak width.

Van de Walle modifies Niehuis to provide an analysis of the energy distribution of Bismuth where the individual charge states produce a regular odd-even alternation, and where different charge states are produced by different emission mechanisms.

Therefore, it would have been obvious to one of ordinary skill that Niehuis and Orloff would use the  $\text{Bi}_n^{p+}$  spectral analysis of Van de Walle to provide a model for defining the process by which certain charge states are produced by a liquid metal ion source.

Regarding the limitation (c) missing from Niehuis, as described above Figure 1 of Niehuis shows the ions generated in source IQ are filtered in mass filter MF to produce the primary ion beam incident on sample P. Niehuis also discloses at Col. 6, line 42-7 that, the primary ions are essentially identical primary ions, which one of ordinary skill would recognize is not a mixed beam but is comprised of ions having a single charge state. In addition, one of ordinary skill in the art would also recognize that use of the Mass filter MF includes separating multiply and singly charged ions such that only one charge state would be onwardly transmitted and focused on the sample P. See for example, USPN 6,791,078 to Giles.

Therefore, it would have been obvious to one of ordinary skill that use of mass filter MF in accordance with the combination of Niehuis and Orloff would include filtering out all the Bismuth ions and onwardly transmitting ions of only one type or charge state to provide a primary ion beam comprised of essentially identical  $\text{Bi}_n^{p+}$  ions thereby increasing the resolution of the analysis.

6. Regarding claims 2 and 3, the combination of Niehuis, Orloff and Van de Walle discloses a primary ion beam comprised of essentially identical  $\text{Bi}_n^{p+}$  ions, and the use of a

time-of flight, secondary ion mass spectrometer , as described above regarding claims 1 and 6.

7. Regarding claim 4, the combination of Niehuis, Orloff and Van de Walle discloses a primary ion beam having several milliamps of ion current. See Orloff, Col. 9, line 37-43.

8. Regarding claims 5 and 7, the combination of Niehuis, Orloff and Van de Walle also teaches a liquid metal ion source using a Bi-Pb alloy. See page 5512 in Van de Walle.

### ***Conclusion***

4. The Amendment filed on 3-7-2008 has been considered but is ineffective to overcome the references cited in the Office Action mailed 12-12-2007.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.



5. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (571) 272-2475. The examiner can normally be reached on Monday-Friday from 6:30 am to 3:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiners supervisor Robert Kim can be reached at (571) 272-2293. The fax phone number for the organization where the application or proceeding is assigned is 571 273 8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PJ  
June 18, 2008

/ROBERT KIM/

Supervisory Patent Examiner, Art Unit 2881